Nicholas Vadivelu - Curriculum Vitae

nicholas.vadivelu@gmail.com · nicholasvadivelu.com

EDUCATION

Bachelor of Mathematics, Computer Science & Statistics (Double Major) 2017 - 2022
University of Waterloo, Waterloo, ON,
Cumulative GPA: 3.94/4.00

EXPERIENCE

Citadel, *Quantitative Research Intern* Jun - Dec 2021
- Researched transfer learning and out-of-domain generalization to predict user behaviour and demographics between datasets of different modalities (under NDA).

NVIDIA, *Performance Software Engineering Intern* Aug - Dec 2020
- Reduced BERT/Megatron **inference latency by 30%** through sparsity (C++).
- Open-sourced sparse BERT (Python), the current fastest inference implementation.

Uber ATG, *Research Intern* Jan - Aug 2020
- Improved **object detection by 90%** (AP) and **motion forecasting by 22%** (L2) of a self-driving neural net under realistic positional error.
- Published the learned positional error correction system at CoRL (first author).

Google Brain, *Research Software Engineering Intern* May - Aug 2019
- Unlocked K-FAC for **over 370,000 users** by implementing and open-sourcing automatic support for arbitrary neural network architectures (Keras).
- Enabled trivial multi-node training with efficient distributed operation placement.
- Designed, created, and open-sourced idiomatic, reproducible training recipes.

John Hancock Financial, *Data Science Intern* May - Aug 2018
- Achieved a **fraud detection rate of 63%** by designing an unsupervised ML model.
- Deployed 25 fraud heuristics that **correctly flagged 100+** fraudulent claims.

Sunnybrook Research Institute, *Software Developer Intern* Jul - Aug 2017
- Improved MRI segmentation accuracy by **up to 80%** and reduced time to contour MRI scans from $\sim$ **5 hrs to** $\sim$ **40 mins**; Acknowledged in Hyvärinen et al, 2021

McMaster University, *Research Intern* Jul - Aug 2016
- Collected, analyzed, and presented research on photoluminescence data; Acknowledged in Miller et al, 2017.

RESEARCH

Advisor(s): **Prof. Martin Lysy, Dr. Lawrence Murray**, Winter 2021
- Research in Sequential Monte Carlo methods for inference on COVID models.

Advisor(s): **Prof. Gautam Kamath**, Fall 2020
- Research in computationally efficient differentially private SGD.

Advisor(s): **Prof. Pascal Poupart**, Fall 2019
- Research in practical second-order methods for neural network optimization.

Advisor(s): **Prof. Pascal Poupart**, Winter 2019
- Research in deep learning-based methods to identify bugs in source code.

PUBLICATIONS

(* = equal contribution)

Pranav Subramani*, **Nicholas Vadivelu***, Gautam Kamath. Enabling Fast Differentially Private SGD via Just-in-Time Compilation and Vectorization. In *Conference on Neural Information Processing Systems (NeurIPS)*, Virtual, 2021.

Nicholas Vadivelu, Mengye Ren, James Tu, Jingkang Wang, Raquel Urtasun. Learning to Communicate and Correct Pose Errors. In *Conference on Robot Learning (CoRL)*, Virtual, 2020.

SOFTWARE

ShapeCheck: Framework agnostic runtime array checking library.

JAX ResNet: Composable, unit-tested code and checkpoints for ResNet variants.

Contributed to: TensorFlow, PyTorch Ignite, Optax, Flax.

LEADERHIP & ACTIVITIES

Math Faculty, *Peer Mentor*	Jan 2021 - Present
Tech+, *Mentor*	Jan 2019 - Present
Technical Blog, *nicholasvadivelu.com*	Sep 2018 - Present
UWaterloo Data Science Club, *Lecturer*	Sep 2018 - Present
Hack the North, *Mentor/Workshop Lead*	Sep 2018, 2019
WATonomous, *Computer Vision Developer*	Sep 2017 - Apr 2018

AWARDS

Jessie W.H. Zou Memorial Award (Top Undergrad Researcher in CS Department)	2021
President's Research Award ($1500)	2020
David Shepherd Upper-Year Scholarship in Mathematics ($5000)	2019
President's Research Award ($1500)	2019
Faculty of Mathematics Scholarship ($5000)	2018
University of Waterloo President's Scholarship of Distinction ($1500)	2018
Fahd Ananta Fellowship Award in Computer Science ($200)	2017

TALKS

Clustering for Image Analysis (with Kanika Chopra). *WiSTEM High School Student Conference*, Feb 2021.

Establishing a Productive ML Research Workflow. *Hack the North++*, Jan 2021.

Interactive Data Visualization with Altair. *Hack the North++*, Jan 2021.

Overview of Data Science and Data Science Careers. *UWaterloo Data Science Club*, Aug 2020.

What You See is What You Get: Exploiting Visibility for 3D Object Detection. *Uber ATG Reading Group*, Jul 2020.

Introduction to JAX for Machine Learning and More. *University of Waterloo Data Science Club*, Jul 2020.

Stand-Alone Self-Attention in Vision Models. *Uber ATG Reading Group*, Apr 2020.

Neural Network Optimization Methods. *Reading Group*, Dec 2019.

Introduction to Neural Networks in TensorFlow 2.0. *Laurier Developer Student Club*, Nov 2019.

Introduction to Machine Learning with Scikit-learn. *Hack the North*, Sep 2019.

Introduction to Data Cleaning with Pandas. *Hack the North*, Sep 2019.